

Claims

What is claimed is:

- [c1] An apparatus for monitoring a meter, comprising:
 - a meter that monitors usage of a distribution system;
 - an electronic data recorder that processes data from the meter;
 - an external unit that controls the processing of data in the electronic data recorder with a communication protocol; and
 - where the communication protocol comprises,
 - an initialization signal,
 - an interval identification signal, and
 - a clock signal.
- [c2] The apparatus of claim 1, where the meter is a utility meter.
- [c3] The apparatus of claim 2, where the utility meter is a water meter.
- [c4] The apparatus of claim 3, where the water meter is self-powered.
- [c5] The apparatus of claim 4, where the water meter is power by a Wiegand Wire.
- [c6] The apparatus of claim 5, where the Wiegand Wire powers the electronic data recorder.
- [c7] The apparatus of claim 1, where the external unit is a meter interface unit.
- [c8] The apparatus of claim 1, where the initialization signal is between 25 and 100 milliseconds in duration.
- [c9] The apparatus of claim 1, where the clock signal operates at a frequency of 1200 hertz.

- [c10] The apparatus of claim 1, where the clock signal operates at a frequency of 19.2 kilohertz.
- [c11] The apparatus of claim 1, where the electronic data recorder is activated on 15 minute intervals by the communications protocol.
- [c12] The apparatus of claim 11, where the interval identification signal identifies each 15 minute interval in a one hour time period.
- [c13] The apparatus of claim 1, where the electronic data recorder processes data from the meter to detect a leak in the distribution system.
- [c14] The apparatus of claim 13, where the leak is continuous.
- [c15] The apparatus of claim 13, where the leak is intermittent.
- [c16] The apparatus of claim 13, where the electronic data recorder further processes data from the meter to determine how long the leak has been present.
- [c17] The apparatus of claim 1, where the electronic data recorder processes data from the meter to determine a flowrate in the distribution system.
- [c18] The apparatus of claim 1, where the electronic data recorder processes data from the meter to determine the direction of a flowrate in the distribution system.
- [c19] The apparatus of claim 1, where the electronic data recorder processes data from the meter to detect an absence of a flowrate in the distribution system.
- [c20] The apparatus of claim 19, where the electronic data recorder further processes data from the meter to determine how long the flowrate has been absent.
- [c21] The apparatus of claim 1, where the electronic data recorder processes data from the meter to detect backflow in the distribution system.

- [c22] The apparatus of claim 21, where the backflow is continuous.
- [c23] An apparatus for monitoring meter usage, comprising:
a meter that monitors usage of a distribution system;
means for receiving data from the meter;
means for processing data from the meter; and
means for detecting a leak in the distribution system.
- [c24] The apparatus of claim 23, further comprising:
means for determining a flowrate in the distribution system.
- [c25] The apparatus of claim 23, further comprising:
means for determining the direction of a flowrate in the distribution system.
- [c26] The apparatus of claim 23, further comprising:
means for detecting an absence of a flow in the distribution system.
- [c27] The apparatus of claim 23, further comprising:
means for detecting a backflow in the distribution system.
- [c28] A method for calculating utility usage patterns, comprising:
receiving usage data from a meter that monitors usage of a distribution system;
processing the usage data to calculate utility usage patterns; and
where the utility usage patterns identify predefined conditions in the distribution system.
- [c29] The method of claim 28, where the predefined conditions are indicated in levels of magnitude.
- [c30] The method of claim 29, where the predefined conditions are indicated in at least 3 levels of magnitude.

- [c31]** The method of claim 28, where the utility usage patterns are determined on a moving time scale.
- [c32]** The method of claim 28, where the predefined conditions comprise a leak in the distribution system.
- [c33]** The method of claim 28, where the predefined conditions comprise a flowrate in the distribution system.
- [c34]** The method of claim 28, where the predefined conditions comprise the direction of a flowrate in the distribution system.
- [c35]** The method of claim 28, where the predefined conditions comprise an absence of a flow in the distribution system.
- [c36]** The method of claim 28, where the predefined conditions comprise a backflow in the distribution system.
- [c37]** The method of claim 28, where the meter is a water meter.
- [c38]** The method of claim 37, where the water meter is self-powered.
- [c39]** The method of claim 38, where the water meter is powered by a Wiegand Wire.
- [c40]** A method for calculating utility usage patterns, comprising:
 - step for receiving usage data of a distribution system;
 - step for processing the usage data to calculate utility usage patterns; and
 - step for identifying predefined conditions in the distribution system based on the utility usage patterns.